EE/CMPEN/CMPSC Electives Night

Shaurya Rastogi
President, HKN Epsilon Chapter
B.S., Computer Engineering ’17
shaurya.rastogi@psu.edu

Numbers Matter!

Endings of 300/400 level specialties

- Electronic Design x1x
- Optics x2x
- Electromagnetics x3x
- Semiconductor Devices x4x
- Signal and Image Processing x5x
- Communications x6x
- Space Systems and Remote Sensing x7x
- Power Systems and Control Systems x8x
- Computer Hardware/Software xxx

Statistics and Senior Design

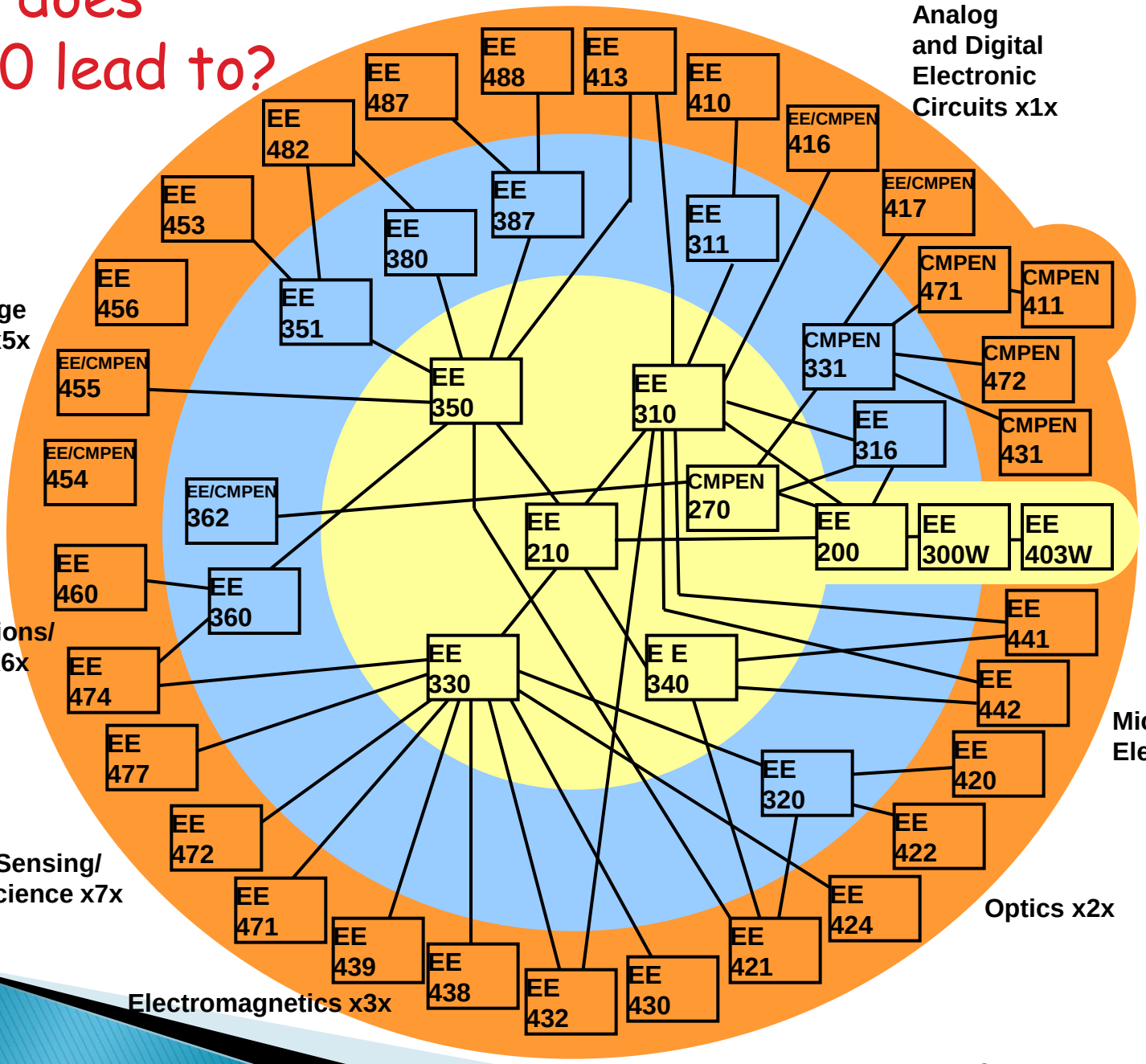
- Presented at the end of the night

Consult "Areas of Specialization" on www.ee.psu.edu
http://www.ee.psu.edu/Undergraduate/SpecializationAreas.aspx

PENNSTATE 1855

HKN

What does EE 210 lead to?



Electronic Circuit Design

PENNSTATE

1855

HKN

EE 311
Electronic Circuit Design II

- **What is this course about?**
  - Intermediate course on circuit design and analysis
  - Expands on the topics covered in the first circuit design course (EE 310)
  - A little more focus on design than analysis
- **Skills/Prerequisites needed for course?**
  - If you liked 310 you will like this course
  - Understanding of circuit analysis
  - Prerequisite: EE 310 and EE 350/352
- **What will you learn?**
  - In depth look at almost everything from 310, including MOSFETs BJTs and Operational Amplifiers
  - Understanding of more circuit design considerations such as feedback, stability and efficiency
- **What is the workload?**
  - Weekly homework problems, answers to homework are generally given
  - Two midterms and a final
  - Exams were open notes, open book
- **Overall difficulty of the course?**
  - Material is slightly harder than 310 and some of the circuit analysis can get complex and tedious.

PENNSTATE 1855

HKN

SPRING ONLY

EE 410
Linear Electronic Design

- **What is this course about?**
  - Advanced course on circuit design and analysis
  - Expands on many of the topics covered in the second circuit design course (EE 311)
  - This course focuses almost primarily on design rather than analysis

- **Skills/Prerequisites needed for course?**
  - Again, if you liked 310 and 311 you will enjoy this class
  - Strong understanding of circuit analysis
  - Prerequisite: EE 311

- **What will you learn?**
  - Op amp construction/configuration – Good project to use when talking to recruiters
  - Different types of filter design
  - Application of Linear Circuits

- **What is the workload?**
  - Bi-weekly homework problems, homework not collected but useful
  - Bi-weekly quizzes and a final
  - 2 hour weekly design lab

- **Overall difficulty of the course?**
  - Material isn't that difficult, quizzes are open note/open book, but the design lab can be very time consuming

PENNSTATE 1855

HKN

FALL ONLY

EE 413
Power Electronics

- **What is this course about?**
  - Introductory course to switch-mode electrical power converters, and electrical characteristics and thermal limits of semiconductor switches.
  - Expands on the topics covered in a standard linear systems (EE 350).
  - Exposes the student to various electric motor design implemented in the world today.
- **Skills/Prerequisites needed for course?**
  - Intermediate understanding of Fourier analyses and Switching Devices
  - Intermediate understanding of MATLAB
  - Prerequisite: EE 350, EE 310
- **What will you learn?**
  - analysis, design, and application of the switch-mode power converters (buck, boost, buck-boost)
  - relationship between the magnitude of the fundamental frequency component and/or average value of the voltages and currents at the two ports of the particular converter.
  - power device characteristics, the design of gate drive and feedback circuits, and the analysis/design of elementary controllers
- **What is the workload?**
  - Weekly homework, with occasional MATLAB problems
  - Two midterms and a final
  - No labs
  - Considerable derivation/examples worked out in class
- **Overall difficulty of the course?**
  - You will **work hard** in this class but in turn, you will get a firm understanding of the given course material. Overall material is a little challenging to understand in the beginning but professor is willing to help you understand

PENNSTATE 1855

HKN

CMPEN 472

SPRING ONLY

Microprocessor and Embedded Systems

- **What is this course about?**
  - The hardware and software behind embedded systems
  - Architecture, design, assembly language, programming, interfacing, bus structure, and interface circuits and their use in embedded systems
- **Skills/Prerequisites needed for course?**
  - This course is a senior level elective for students in computer engineering and computer science
  - Intermediate understanding of programming and related skills
  - Prerequisite of CMPEN 331 (specifically assembly programming)
- **What will you learn?**
  - How to interpret and analyze basic microprocessor system hardware
  - Develop, write and debug programs in a microprocessor's assembly language
  - Use standard assembly language program development tools
  - Use of general department computing facilities consisting of UNIX workstations running the appropriate program development tools
- **What is the workload?**
  - 6-12 homework problems
  - Two midterms and a final
  - Honors Section usually available in the spring semesters
- **Overall difficulty of the course?**
  - Varies from instructor-to-instructor as well as the microprocessor used
  - Material isn't too difficult to grasp, but student are exposed to many theoretical problems associated with communication systems

PENNSTATE 1855

HKN

EE/CMPEN 416
Digital Integrated Circuits

FALL ONLY

- **What is this course about?**
  - Course on designing digital integrated circuits using BJT's, MOSFET's, and CMOS.
  - Learn about transistor design behind logic gates, flip-flops, memory, analog switches, multiplexers, and converters.
- **Skills/Prerequisites needed for course?**
  - EE 310, CMPEN 270
  - Have to have a firm grasp on large and small scale circuit analysis with MOSFET's and BJT's.
  - Familiar with the topics that were discussed in CMPEN 270, such as logic gates.
- **What will you learn?**
  - How to design and analyze digital integrated circuits.
  - How to create logic functions out of MOSFET's and CMOS.
  - Also learned about the history and use of tube amplifiers.
- **What is the workload?**
  - Three exams, including final
  - 7 Homework assignments every other week.
  - Five labs every other week followed by the semester project
  - Open note open book quiz every other week
- **Overall difficulty of the course?**
  - Wasn't that difficult
  - Read the book and go to class and you will be fine.
  - Keep up with notes to score well on the quizzes

PENNSTATE 1855

HKN

EE/CMPEN 417

FALL ONLY

Digital Design Using Field Programmable Device

- **What is this course about?**
  - Hands on course that introduces the design and implementation of FPGA's
  - Introduction and understanding of Verilog and System Verilog languages.

- **Skills/Prerequisites needed for course?**
  - CMPSC 201, CMPEN 270, CMPEN 331, some professors allow you to take without all prerequisites
  - Firm understanding of the basics of software/hardware programming.

- **What will you learn?**
  - A lot of real world knowledge on how FPGA's work and how to effectively program them.
  - Steps in designing a PCB board which has an FPGA, process for selecting the best FPGA for a design.
  - How to program in System Verilog.

- **What is the workload?**
  - Large semester long project. Design and tools intensive course
  - About 8 labs/homeworks and 4 pop quizzes spread throughout the semester.
  - Some professors don't have exams, current professor has 2

- **Overall difficulty of the course?**
  - The labs can be somewhat time consuming depending on your programming skills.
  - The course project can be hit or miss, meaning everything can go as planned and it won't require a huge amount of time. Or everything can go wrong and you'll spend hours on end on it.

PENNSTATE 1855

HKN

CMPEN 471

FALL ONLY

Logical Design of Digital Systems

- **What is this course about?**
  - Basic switching theory and design of digital circuits, including combinatorial, synchronous, sequential, and asynchronous sequential circuits.
  - Analysis, design, and implementation of digital circuits and systems using the state-of-the-art CAD tools and programmable chip.
- **Skills/Prerequisites needed for course?**
  - CMPEN 331, CMPEN 271
  - Firm understanding of CMPEN 271 topics
- **What will you learn?**
  - Ability to analyze and design optimized complex combinatorial circuits in both transistor and gate level.
  - Ability to analyze and design optimized synchronous digital circuits and asynchronous sequential circuits.
  - Learn how to synthesize and design a digital system using hardware description language (VHDL, Verilog).
- **What is the workload?**
  - Two midterm exams and a final
  - Six homework assignments and Seven pop quizzes
  - Eight VHDL labs spread throughout the semester
- **Overall difficulty of the course?**
  - Tough, especially if you're not interested in HDL design.

PENNSTATE 1855

HKN

Optics

PENNSTATE

1855

HKN

EE 320

Introduction to Electro-Optical Engineering

- **What is this course about?**
  - The course covers the basics of optical systems, focusing on the interaction of waves with materials
  - Expands on the topics covered in EE 330
  - Specifically covers lenses, lasers, diffraction, and other types of interference.

- **Skills/Prerequisites needed for course?**
  - Pre-requisite: EE 330
  - Physics 214 is extremely useful
  - Emphasis on concepts as well as recognizing the correct equation or equations for each problem

- **What will you learn?**
  - Several fundamental areas of modern optics, optical processes, and devices
  - A brief history of the ongoing struggle to understand the photon

- **What is the workload?**
  - Weekly homework problems
  - Two midterms and a final
  - No labs

- **Overall difficulty of the course?**
  - Extremely straight forward, whatever time you put into this class will be directly proportional to what kind of grade you get in this class.
  - Material isn't too difficult to grasp, but student are exposed to many theoretical problems associated with the duality of light

PENNSTATE 1855

HKN

EE 420

FALL ONLY

Electro-optics: Principles and Devices

- **What is this course about?**
  - Principles and devices in electro-optics
  - Optical systems, optical image processing, holography
  - Main topics include Fourier Optics and Diffraction Theory
- **Skills/Prerequisites needed for course?**
  - EE 320 is only prerequisite, but knowledge of EE 350 is very helpful
  - Math can be complicated at times, but there are patterns in the math that make it easier to understand
  - Good prep for EE 422 and other optic courses
- **What will you learn?**
  - Spatially linear systems and transforms
  - Diffraction theory, partial coherence theory
  - Optical image detection, storage, and display; holography
- **What is the workload?**
  - Weekly homework assignments
  - Typically one midterm and final
- **Overall difficulty of the course?**
  - Most people that took the class did well, but material can be difficult at times
  - Expands on topics covered in EE 320, but gives more mathematical reasoning

PENNSTATE 1855

HKN

EE 421

FALL ONLY

Optical Fiber Communications

- **What is this course about?**
  - Operation of components of optical devices, including sources, fibers and detectors
  - Operation of optical fiber communication systems as a whole
  - Great course for EE students interested in optics/communications.
- **Skills/Prerequisites needed for course?**
  - EE 320, EE 350, E SC 314 (or EE 397E)
  - Some prior knowledge of fiber optic communications expected
  - Programming skills, some familiarity with MatLab
- **What will you learn?**
  - Why fiber optics is useful (high bandwidth, low attenuation, immunity from electromagnetic interference, etc.)
  - Light propagation in waveguides, both geometrical approach and wave optics approach (Maxwell's equations)
  - Critical components of fiber optic communication systems—optical transmitters, receivers, modulators, demodulators, couplers, amplifiers, fiber optic gratings, etc.
  - Fiber optic networks—architectures (e.g. star connect), multiplexing techniques, connecting fiber optic networks with non-fiber optic networks, and current trends in fiber optic networks
- **What is the workload?**
  - Weekly homework assignments
  - Covers a wide range of topics, concerning fiber optic communication
  - Typically two midterms and a final
- **Overall difficulty of the course?**
  - This course is typically on the more difficult side

PENNSTATE 1855

HKN

EE 422

FALL ONLY

Optical Engineering Laboratory

- **What is this course about?**
  - Hands-on experience with optics in the laboratory
  - Applications in fiber optics communication, sensing, holography, optical switching and processing
  - Great course for EE students interested in optics, communications, and/or remote sensing.
- **Skills/Prerequisites needed for course?**
  - EE 320, but knowledge of EE 420 is very helpful
  - Knowledge of EE 420, 421, and 424 may provide an interesting perspective to the lab
  - Experience in writing labs is a plus!
- **What will you learn?**
  - Optical transforms, electro-optics devices, and signal processing
  - Fiber optics transmission and holography
  - Learn to replicate theoretical principles in the laboratory
- **What is the workload?**
  - Approximately 6 homeworks
  - 12 total lab (about an hour each)
  - Weekly lab reports (not graded) and 1 final lab report of all the labs
  - Typically 2 midterms and a final
- **Overall difficulty of the course?**
  - Topics covered are easy to follow, and labs are relatively fast
  - If you're willing to put the effort into the class, can be a great experience

PENNSTATE 1855

HKN

SPRING ONLY

EE 424

Principles and Applications of Lasers

- **What is this course about?**
  - Principles of lasers—generation, propagation, detection, and modulation
  - Applications in fiber optics communication, sensing, holography, optical switching and processing
  - Great course for EE students interested in optics, communications, and/or remote sensing.
- **Skills/Prerequisites needed for course?**
  - EE 330, ESC 400, or PHYS 400 required
  - Maxwell's equations, wave theory, and complex analysis
  - Other optics courses are helpful (EE 320, 421, 420)
- **What will you learn?**
  - Basic principles of lasers, how they're generated, how they propagate, how they're detected and modulated
  - Common applications for lasers, e.g. fiber optics, holographic, optical switching
- **What is the workload?**
  - Weekly problem sets covering assigned readings (typically 2 to 6 hours)
  - Typically 2-3 midterms, a final, and no labs
- **Overall difficulty of the course?**
  - Math gets complicated sometimes, but simplifies nicely
  - Overall, this course is typically easy

PENNSTATE 1855

HKN

Electromagnetism

PENNSTATE

1855

HKN

SPRING ONLY

EE 430

Principles of Electromagnetic Fields

- **What is this course about?**
  - Laws of electrodynamics, boundary value problems, relativistic effects, waves in dielectrics and ferrites, diffraction and equivalence theorems.

- **Skills/Prerequisites needed for course?**
  - Extends heavily from EE 330.
  - Prerequisite of EE 330.

- **What will you learn?**
  - Understand sources of electric and magnetic fields and coupling between them.
  - Boundary conditions, energy and power associated with electromagnetic fields, understand and design transmission lines and waveguides.
  - Understand radiation from antennas.

- **What is the workload?**
  - Homework: bi-weekly;10-15 hours; includes derivations.
  - Tests: 3 tests with one during finals week.
  - Paper: 17 pages single spaced on any electromagnetism concept.

- **Overall difficulty of the course?**
  - Homework is time consuming and has derivations.
  - Tests are open book and notes and are related to homework (usually does not contain derivations)

PENNSTATE 1855

HKN

FALL ONLY (starting 2014)

EE 432

UHF and Microwave Engineering

- **What is this course about?**
  - Transmission line and wave guide characteristics and components at UHF and lower.
  - Power flower through transmission lines concentrating on S-parameters.
  - Microstrip Engineering, amplifiers
- **Skills/Prerequisites needed for course?**
  - Basics from EE 310. Concentrates heavily on EE 330 concepts. SMITH CHARTS!!!
  - Prerequisite of EE 310 and EE 330
- **What will you learn?**
  - How to use ADS. Advanced Design Software.
  - Analyze RF and microwave circuits; Transmission lines, impedance matching, passive RF and microwave components.
- **What is the workload?**
  - Projects: design of UHF-microwave amplifiers.
  - Weekly homework: book problems (No to little derivations.)
  - Labs: lab reports tri-weekly.
  - Two Midterm and a Final.
- **Overall difficulty of the course?**
  - Tests: Based on homework problems
  - Lab: 4 hour labs, difficulty varies. May require out-of-class work for the final few labs
  - Homework: numerous book problems but most are not that difficult.

PENNSTATE 1855

HKN

EE 438

Antenna Engineering

FALL ONLY

- **What is this course about?**
  - Radiation from small, arrays. Multi-frequency, and aperture antennas.
  - Also, antenna characteristics and impedance concepts and measurements.
- **Skills/Prerequisites needed for course?**
  - Antenna analysis
  - Prerequisite of EE 330
- **What will you learn?**
  - How and why antennas radiate.
  - How to produce radiation patterns of various antennas.
  - Various antenna parameters: input impedance, directivity, gain, beam width, polarization, and efficiency
- **What is the workload?**
  - Varies from teacher to teacher: HW once every 1-2 weeks. Usually book problems
  - Two midterms. No test during finals week.
  - Report due on finals week on an antenna system.
- **Overall difficulty of the course?**
  - Homework may have derivations included (not many.)
  - Test: normal difficulty, but usually large curve

PENNSTATE 1855

HKN

EE 439

SPRING ONLY

Radio-wave Propagation in Communications

- **What is this course about?**
  - Radio-wave propagation in mobile, terrestrial, and satellite communications;
  - Radio-wave propagation in different mediums: free space, rain, snow and in other atmospheric conditions
  - Frequency range: microwave and lower
- **Skills/Prerequisites needed for course?**
  - Prerequisite of EE 330.
- **What will you learn?**
  - How to analyze incoming and receiving power from signals through different mediums.
  - How different mediums affect the incoming signal.
  - How diffraction, refraction, polarization and others affect a signal.
- **What is the workload?**
  - Homework once every 1-2 weeks. Not from book. Homework is not graded.
  - Volunteer project using software to analyze radio-wave propagation in different scenarios.
  - Announced Quizzes based on homework.
- **Overall difficulty of the course?**
  - Only numerical homework answers given, which can be difficult.
  - No book so must attend class and take notes
  - Test: based off homework and quizzes.

PENNSTATE 1855

HKN

Semiconductor Devices

PENNSTATE

1855

HKN

EE 441

Semiconductor Integrated Circuit Technology

- **What is this course about?**
  - Fundamental processing techniques used in fabricating integrated circuits
  - Hands-on experience in the clean room (if this is your field of interest, looks great on the résumé)
  - Great course for EE students interested in materials and devices (microelectronics, optoelectronics, etc.)

- **Skills/Prerequisites needed for course?**
  - EE 310 and E SC 314 (EE 397E recommended but not significantly advantageous in this course)
  - Much of this course is memorization and clean room experience; calculations are typically minimal.
  - Don't drop your wafer! They have back-ups, but it's embarrassing and costs money.

- **What will you learn?**
  - Lots of important processing techniques, and the various advantages and disadvantages
  - Hands-on experience in the cleanroom—handling wafers, spinning photo-resist, operating the mask aligner and performing lithography

- **What is the workload?**
  - Biweekly (more or less) problem sets covering assigned readings (typically 4 to 8 hours)
  - Typically 4 lab reports (time required varies, last one is the longest)
  - Typically 1 midterm and a final

- **Overall difficulty of the course?**
  - If you are good at memorizing and writing good lab reports, this course will be moderately easy
  - This is not a typical undergraduate EE course—math skills won't help you much

PENNSTATE 1855

HKN

EE 442
Solid State Devices

FALL ONLY

- **What is this course about?**
  - Solid state physics, with a particular focus on devices (MOSFETs, diodes, LEDs, solar cells, etc.)
  - Device characterization (band diagrams, p-n junction, MS-junction, MOS capacitor, I-V curves, etc.)
  - Great course for EE students interested in materials and devices (microelectronics, optoelectronics, etc.)

- **Skills/Prerequisites needed for course?**
  - E SC 314 (EE 397E is highly recommended, you'll start out ahead of the pack)
  - Familiarity with band diagrams and p-n junctions is advantageous
  - Thinking conceptually is crucial for performing calculations correctly

- **What will you learn?**
  - Moore's law and the effects of scaling transistors, and a crash course in quantum mechanics
  - Carrier transport in p-n junctions, MS junctions, MOS capacitors
  - Band diagrams, E-k diagrams, Kronig-Penny Model, Poisson's equation, and the continuity equation
- **What is the workload?**
  - Weekly problem sets covering assigned readings (typically 3 to 6 hours)
  - Typically 1 midterm, a final, and no labs
- **Overall difficulty of the course?**
  - If you remember the concepts from 314 or 397E, this course should only be moderately difficult at worst
  - Homework is the best preparation for tests, usually anything you don't understand is explained in the book

PENNSTATE 1855

HKN

Signal/Image Processing

PENNSTATE

1855

HKN

EE 351
Discrete-Time Linear Systems

- **What is this course about?**
  - Nyquist sampling theorem
  - Analysis of LCCDE
  - Extension of topics covered in EE 350, but in the discrete-time domain
- **Skills/Prerequisites needed for course?**
  - Strong understanding of Fourier and Laplace analyses
  - Intermediate understanding of MATLAB
  - Important to take right after EE 350, it is a prerequisite for many other EE electives
  - Prerequisite of EE 350
- **What will you learn?**
  - Discrete Time Fourier Transform (DTFT)
  - Discrete Time Fourier Series (DTFS)
  - Z-transform and its region of convergence
- **What is the workload?**
  - Weekly homework problems, usually involving MATLAB components
  - Two midterms and a final, with note sheets
  - No labs
- **Overall difficulty of the course?**
  - Fairly straightforward for students who enjoyed EE 350

PENNSTATE 1855

HKN

EE 453

Fundamentals of Digital Signal Processing

- **What is this course about?**
  - Applications of DTFT, DTFS, and Z transform
  - Design of FIR and IIR filters
  - Extension of topics covered in EE 350, but in the discrete-time domain

- **Skills/Prerequisites needed for course?**
  - Strong understanding of Fourier and Z-transform analyses
  - Intermediate understanding of MATLAB
  - Prerequisite of EE 351 or EE 353

- **What will you learn?**
  - Learn how to design and implement actual finite impulse response (FIR) and infinite impulse response (IIR) filters analytically and in practice using MATLAB
  - Computation of DTFS via the Fast Fourier Transform (FFT)

- **What is the workload?**
  - Weekly homework problems, usually involving MATLAB components
  - Two midterms and a final
  - Three labs per semester

- **Overall difficulty of the course?**
  - A direct extension of EE 351 but delves into the difficult mathematics behind the concepts

PENNSTATE 1855

HKN

EE/CMPEN 454

FALL ONLY

Fundamentals of Computer Vision

- **What is this course about?**
  - Introductory to various topics concerning computer vision
  - Touches upon image formation, segmentation, extraction, recovery, and recognition of images
  - Main goal: Understand how computers interpret visual information
- **Skills/Prerequisites needed for course?**
  - Strong understanding of three-dimensional imaging, from MATH 230
  - Intermediate understanding of MATLAB
  - Prerequisite of MATH 230/231, and CMPSC 201/121
- **What will you learn?**
  - Binary vision systems: Identify basic objects based on segmentation, contours, and physical dimensions
  - Depth from vision: Emphasis on stereo imaging, algorithms based on distances from points on the object
  - Computer vision: Sequence of images over time, based on spatial or temporal changes in an image
  - 3D object recognition: Object identification and localization
- **What is the workload?**
  - Bi-weekly homework assignments
  - Two midterms and a final
  - Model projects using MATLAB
- **Overall difficulty of the course?**
  - Material isn't too difficult to grasp, mainly concepts touching upon computer vision procedures

PENNSTATE 1855

HKN

EE/CMPEN 455

FALL ONLY

Introduction to Digital Image Processing

- **What is this course about?**
  - Overview of digital image processing techniques and their applications
  - Current techniques for processing and manipulating digital images
  - Main goal: Understand how computers interpret visual information
- **Skills/Prerequisites needed for course?**
  - Strong understanding of discrete/continuous functions
  - Good understanding of word problems, and application to equations
  - Prerequisite of EE 350/353 and CMPSC201/121
- **What will you learn?**
  - Digital image processing techniques: Applications, image sampling, enhancement, and analyses
  - One/Two Dimensional Fourier Transform analyses
  - Discrete Cosine Transform: Used in JPEG and MPEG
  - Techniques for image encoding and decoding
- **What is the workload?**
  - Weekly homework assignments
  - Do extra problems to get a full understanding of Probability
  - Two midterms and a final
- **Overall difficulty of the course?**
  - Materials/theorems are straightforward, but application of these theorems makes this class challenging

PENNSTATE 1855

HKN

Communications

PENNSTATE

1855

HKN

EE 360
Communication Systems I

- **What is this course about?**
  - Introductory course to communication systems and networks
  - Expands on the topics covered in a standard linear systems class (EE 350)
  - Exposes the student to various analog/digital systems seen in the world

- **Skills/Prerequisites needed for course?**
  - Strong understanding of Fourier analyses
  - Intermediate understanding of MATLAB
  - Prerequisite of EE 350 or EE 352

- **What will you learn?**
  - Analog Communications – AM (amplitude modulation), FM/PM (angle modulation)
  - Types of digital/analog communication systems, and their schematic drawings
  - Understanding the sampling theorem, quantization, and bit rates associated with digital communication

- **What is the workload?**
  - Weekly homework problems, with two MATLAB assignments per semester
  - Two midterms and a final
  - No labs

- **Overall difficulty of the course?**
  - Material isn't too difficult to grasp, but student are exposed to many theoretical problems associated with communication systems

PENNSTATE 1855

HKN

EE/CMPEN 362
Communication Networks

- **What is this course about?**
  - Introductory course to communication systems and networks
  - More of a stand alone course that details how the internet works
  - Data Transmission and network architecture

- **Skills/Prerequisites needed for course?**
  - Prerequisite of CMPEN 270 and a concurrent STAT course
  - Doesn't really build on anther class, so no real skills are needed

- **What will you learn?**
  - Protocol stack for communication networks; particularly the internet
  - Detailed understanding of the different layers of Communication Networks:
  - Focus of the class can vary substantially with different professors

- **What is the workload?**
  - Weekly homework problems.
  - Two midterms and a final
  - No labs

- **Overall difficulty of the course?**
  - Material is not very challenging, but tests can be tricky. Some of the course boils down to memorization.

PENNSTATE 1855

HKN

EE 460

Communication Systems II

FALL ONLY

- **What is this course about?**
  - Advanced course in communication systems, statistics, and implementation of both with networks
  - Using statistics to predict natural/unnatural behaviors in communications systems
  - Brief analyses of complex distributions in probability
- **Skills/Prerequisites needed for course?**
  - Prerequisite of EE 360, but NO STAT prerequisite/concurrency
  - Definitely DO NOT take this class if you have not taken STAT 401/414/418 previously/concurrently
  - Being able to work in time-frequency domains
- **What will you learn?**
  - Brief introduction to probability (2-3 weeks)
  - Types of communication schemes, and the probability associated with transmitting signals
  - How to treat "white-noise" as a Gaussian distribution, and introduces Information Theory
- **What is the workload?**
  - Weekly homework assignments.
  - One midterm and one final (both 40%)
  - No labs
- **Overall difficulty of the course?**
  - Material is very challenging, and tests are tricky

PENNSTATE 1855

HKN

Space Systems and Remote Sensing

PENNSTATE

1855

HKN

EE 471

FALL ONLY

Introduction to Plasmas

- **What is this course about?**
  - Expands on the topics covered in EE 330; waves in plasmas, diffusion, and resistivity
  - Exposes the student to a variety of theoretical applications pertaining to plasmas
- **Skills/Prerequisites needed for course?**
  - Strong understanding of Electromagnetism
  - Intermediate understanding of MATLAB
  - Prerequisite of EE 330, and strong understanding of differential equations
- **What will you learn?**
  - Plasma Oscillations
  - Collision Phenomena
  - Transport Properties
  - Orbit Theory
  - Typical Electric Discharge Phenomena
- **What is the workload?**
  - Weekly homework problems, with two MATLAB assignments per semester
  - Two midterms and a final
  - Four Lab assignments
- **Overall difficulty of the course?**
  - Material isn't too difficult to grasp, largely theoretical
  - Relatively little work load

PENNSTATE 1855

HKN

EE 472

SPRING ONLY

Space Astronomy and Introduction to Space Science

- **What is this course about?**
  - Introductory course on astronomy
  - Expands on the topics covered in EE330
  - Involves an understanding of the astronomy and science of space as opposed to strictly engr. applications
- **Skills/Prerequisites needed for course?**
  - Strong understanding of Maxwell's Equations
  - Intermediate understanding of MATLAB
  - Prerequisite of EE 330 or PHYS 400
- **What will you learn?**
  - How the Sun produces large currents in space
  - Physics involved in earth orbits
  - Particle motion, plasma physics, and ionosphere topics
- **What is the workload?**
  - Short weekly homework problems
  - One large projects and two mini projects
  - No labs
- **Overall difficulty of the course?**
  - Material is not that difficult but projects do take a good deal of time to complete

PENNSTATE 1855

HKN

SPRING ONLY
(WAS FALL ONLY UNTIL 2014)

EE 474

Satellite Communications Systems

- **What is this course about?**
  - Overview of satellite communications systems, principles, and orbital mechanics
  - Analysis of up/down links, link budgets, and satellite modulation techniques.

- **Skills/Prerequisites needed for course?**
  - Basics from EE 360 and some antenna analysis.
  - Prerequisite of EE 330 and EE 360

- **What will you learn?**
  - How to use STK. (program that models satellites)
  - Digital and analog transmission properties.
  - Satellites, antennas and transmitting schemes.

- **What is the workload?**
  - Homework once every 1-2 weeks. Usually mixture of book problems and teacher's own problems.
  - 3 projects using STK software simulation.
  - Two midterms. No test during finals week.

- **Overall difficulty of the course?**
  - Projects can be time consuming but are not too hard.
  - The homework varies in difficulty and length.
  - Test: normal difficulty

PENNSTATE 1855

HKN

EE/Meteo 477

FALL ONLY

Fundamentals of Remote Sensing Systems

- **What is this course about?**
  - The review of fundamental physical properties leads into discussions of various techniques, including imaging, spectroscopy, radiometry, and active sensing.
  - Several applications to other fields such as medical imaging, oceanography, and geography
- **Skills/Prerequisites needed for course?**
  - Intermediate understanding of MATLAB
  - Prerequisite of EE 330 or METEO 436
  - Also cross-listed as a meteorology course, varying topics may be covered
- **What will you learn?**
  - General Remote Sensing Applications
  - Incorporates E/M
  - Involves optics, space science, geography, and meteorology
- **What is the workload?**
  - Long weekly homework assignments- Interesting -not busy work
  - One midterm quiz, a final, and a report/project
  - No labs
- **Overall difficulty of the course?**
  - Homework is time consuming, but not too difficult to complete.

PENNSTATE 1855

HKN

Power and Control Systems

PENNSTATE

1855

HKN

EE 380

FALL ONLY

Introduction to Linear Control Systems

- **What is this course about?**
  - Introductory course to control systems
  - Expands on the topics covered in a standard linear systems class (EE 350)
  - Covers topics such as state variables, feedback control, root locus, and frequency domain design
- **Skills/Prerequisites needed for course?**
  - Strong understanding of Fourier and Laplace analyses
  - Intermediate understanding of MATLAB
  - Prerequisite of MATH 220; EE 350 or EE 312
- **What will you learn?**
  - State space representation of transfer systems
  - Uses and Implementation of feedback for systems
  - Stability and performance analysis using Bode plots and the Nyquist criterion
- **What is the workload?**
  - Weekly homework problems, usually with MATLAB components
  - Two midterms and a final
  - 4 or 5 labs
- **Overall difficulty of the course?**
  - Challenging due to the theoretical nature of frequency domain analysis

PENNSTATE 1855

HKN

SPRING ONLY

EE 482

Introduction to Digital Control Systems

- **What is this course about?**
  - Continuation of EE 380 concepts
  - Design and analysis in the discrete-time domain
  - Covers topics such as state variables, feedback control, sampling, and frequency domain design
- **Skills/Prerequisites needed for course?**
  - Strong understanding of Fourier, Laplace, and Z-transform analyses
  - Intermediate understanding of MATLAB
  - Prerequisite of EE 380; EE 351 or EE 352
- **What will you learn?**
  - Discrete-time analysis in frequency domain
  - Sampling and hold operations; general A/D and D/A conversion techniques
  - Stability and performance analysis
- **What is the workload?**
  - Weekly homework problems, usually with MATLAB components
  - Two midterms and a final
  - (Approximately) weekly labs
- **Overall difficulty of the course?**
  - Difficulty Level: High, very abstract material
  - Challenging due to the theoretical nature of frequency domain analysis

PENNSTATE 1855

HKN

EE 387
Energy Conversion

- **What is this course about?**
  - Introductory course to energy conversion in electrical, electromagnetic, and electromechanical systems.
  - Expands on the topics covered in a standard linear systems (EE 350) and Electromagnetism (EE330).
  - Exposes the student to various electric motor design implemented in the world today.

- **Skills/Prerequisites needed for course?**
  - Intermediate understanding of Fourier analyses and Magnetic Field Theory
  - Intermediate understanding of MATLAB
  - Prerequisite: EE 350
- **What will you learn?**
  - Methods of determining electromagnetic forces and torques using quasi-static electromagnetics
  - Development of models for electromagnetic and electromechanical systems
  - Fundamental concepts of inductors, transformers, and rotating machines.
- **What is the workload?**
  - Weekly homework, with occasional MATLAB problems
  - Two midterms and a final
  - No labs
- **Overall difficulty of the course?**
  - You will work in this class but in turn, you will get a firm understanding of the given course material. Overall material is a little challenging to understand in the beginning but professor is willing to help you understand

PENNSTATE 1855

HKN

SPRING ONLY

EE 487

Electric Machines and Drives

- **What is this course about?**
  - Analysis of variable-speed drives comprised of AC electric machines, power converters, and control systems.
  - Expands on the topics covered in Energy Conversion (EE 387), Electromagnetism (EE330), and Fourier Analysis (EE 350).
- **Skills/Prerequisites needed for course?**
  - Decent understanding of machine drives and power converter theory
  - Intermediate understanding of MATLAB
  - Prerequisite: EE 387
- **What will you learn?**
  - Inverter implementation and design
  - Induction Machine under V/Hz and Fielded-Oriented Control
  - Permanent Magnet Synchronous Machine under "Brushless dc Machine" and Field Oriented Control
  - Field-Oriented Control & Stator Current Regulation
- **What is the workload?**
  - Weekly homework, with occasional MATLAB problems
  - Two midterms and a final
  - Periodic labs
- **Overall difficulty of the course?**
  - You will **work** in this class but in turn, you will get a firm understanding of the given course material. Overall material is a little challenging to understand in the beginning but professor is willing to help you understand

PENNSTATE 1855

HKN

EE 488

Power Systems Analysis

SPRING ONLY

- **What is this course about?**
  - Introductory course to power systems analysis.

- **Skills/Prerequisites needed for course?**
  - Intermediate understanding of machine drives
  - Intermediate understanding of MATLAB
  - Prerequisites: EE387

- **What will you learn?**
  - Poly-phase Networks –Unbalanced Operation
  - Transmission Line Parameters and Steady State Operation
  - Power Flow, Symmetrical Faults, and Unsymmetrical Faults
  - System Protection and Controls

- **What is the workload?**
  - Weekly homework, with occasional MATLAB and PowerWorld problems
  - Two midterms and a final
  - No labs

- **Overall difficulty of the course?**
  - You will work in this class but in turn, you will get a firm understanding of the given course material. Overall material is a little challenging to understand in the beginning but professor is willing to help you understand

PENNSTATE 1855

HKN

Computer Engineering

PENNSTATE

1855

HKN

CMPEN 331
Computer Organization and Design

- **What is this course about?**
  - Introduction to major components of a computer system
  - how they function and are designed together in executing a program
  - Introduction and understanding of Verilog and VHDL language
- **Skills/Prerequisites needed for course?**
  - CMPEN271 or CMPEN270; CMPSC121 or CMPSC201
  - Understand coding structure, C++ background helps when learning MIPS-32 and VHDL
- **What will you learn?**
  - Will learn about the different components in a computer and how they all interact.
  - How to program in Verilog and assembly language.
  - How to create a 16bit processor and a 32bit ALU
- **What is the workload?**
  - Two midterm exams and a final.
  - 10 Homework assignments, half are "partnered programming" and the other half are individual
  - 5 ANGEL Quizzes.
  - Various programming labs throughout the semester which count as homework.
  - Some of these are decently difficult and time consuming.
- **Overall difficulty of the course?**
  - Usually on the harder end, since it is an introductory course for Computer Engineering
  - It depends on the professor teaching, so it's hard to judge

PENNSTATE 1855

HKN

CMPEN 411

VLSI Digital Circuits

SPRING ONLY

- **What is this course about?**
  - Course is designed to give seniors in computer engineering, electrical engineering, and computer science insight into the design of modern VLSI chips, especially CMOS approaches to design.
  - Digital integrated circuit design, layout, simulation, and fabrication.
  - VLSI design techniques and system architecture; computer-aided design tools and techniques.
- **Skills/Prerequisites needed for course?**
  - CMPEN 371 or CMPEN 471, EE 3
  - Firm understanding of CMPEN 271 topics.
- **What will you learn?**
  - Design the electronic/logic circuits that form the basic building blocks of a computer system.
  - Design, implement, verify and evaluate the operation of a digital systems.
- **What is the workload?**
  - Two midterm exams and a final
  - Six homework assignments and Ten pop quizzes
  - One project that is worth 25% of your grade
- **Overall difficulty of the course?**
  - This class will keep you in 218 IST for all of your free time. Do not take unless you really, really love VLSI design. (Choi is not forgiving with your free time use, but he makes up for it with lenient grading.)

PENNSTATE 1855

HKN

CMPEN 431

Introduction to Computer Architecture

- **What is this course about?**
  - Conceptual design and fundamental operational structure of a computer system
  - It's a blueprint and functional description of requirements and design implementations for the various parts of a computer, focusing largely on the way by which the central processing unit (CPU) performs internally and accesses addresses in memory
- **Skills/Prerequisites needed for course?**
  - Strong drive to finish projects on time
  - Intermediate understanding of programming and related skills
  - Prerequisite of CMPEN 331 or CMPEN 371
- **What will you learn?**
  - The science and art of selecting and interconnecting hardware components to create computers that meet functional, performance and cost goals
  - Pipelining, multiple processors, IO systems, memory hierarchy, and other topics not previously covered in CMPEN 331 or in more depth
- **What is the workload?**
  - About six homework assignments from the textbook
  - A midterms and a final
  - Numerous programming projects involving SimpleScalar Tool to study issues concerned with programming for a processor
- **Overall difficulty of the course?**
  - Varies from instructor-to-instructor but should not be taken lightly

PENNSTATE 1855

HKN

CMPEN 471

FALL ONLY

Logical Design of Digital Systems

- **What is this course about?**
  - Basic switching theory and design of digital circuits, including combinatorial, synchronous, sequential, and asynchronous sequential circuits.
  - Analysis, design, and implementation of digital circuits and systems using the state-of-the-art CAD tools and programmable chip.
- **Skills/Prerequisites needed for course?**
  - CMPEN 331, CMPEN 271
  - Firm understanding of CMPEN 271 topics
- **What will you learn?**
  - Ability to analyze and design optimized complex combinatorial circuits in both transistor and gate level.
  - Ability to analyze and design optimized synchronous digital circuits and asynchronous sequential circuits.
  - Learn how to synthesize and design a digital system using hardware description language (VHDL, Verilog).
- **What is the workload?**
  - Two midterm exams and a final
  - Six homework assignments and Seven pop quizzes
  - Eight VHDL labs spread throughout the semester
- **Overall difficulty of the course?**
  - Tough, especially if you're not interested in HDL design, but Choi is extremely forgiving with grades.

PENNSTATE 1855

HKN

CMPEN 472

SPRING ONLY

Microprocessor and Embedded Systems

- **What is this course about?**
  - The hardware and software behind embedded systems
  - Architecture, design, assembly language, programming, interfacing, bus structure, and interface circuits and their use in embedded systems
- **Skills/Prerequisites needed for course?**
  - This course is a senior level elective for students in computer engineering and computer science
  - Intermediate understanding of programming and related skills
  - Prerequisite of CMPEN 331 (specifically assembly programming)
- **What will you learn?**
  - How to interpret and analyze basic microprocessor system hardware
  - Develop, write and debug programs in a microprocessor's assembly language
  - Use standard assembly language program development tools
  - Use of general department computing facilities consisting of UNIX workstations running the appropriate program development tools
- **What is the workload?**
  - 6-12 homework problems
  - Two midterms and a final
  - Honors Section usually available in the spring semesters
- **Overall difficulty of the course?**
  - Varies from instructor-to-instructor as well as the microprocessor used
  - Material isn't too difficult to grasp, but student are exposed to many theoretical problems associated with communication systems

PENNSTATE 1855

HKN

Statistics Elective

PENNSTATE

1855

HKN

IE 424
Process Quality Engineering

- **What is this course about?**
  - Statistical methods for engineering process characterization and improvement
  - Emphasis for non-Industrial Engineering majors

- **Skills/Prerequisites needed for course?**
  - Familiar with Microsoft Excel
  - Prerequisite of MATH 141 or MATH 220

- **What will you learn?**
  - Industrial standards including but not limited to sigma six
  - How to create and understand varies types of graphs

- **What is the workload?**
  - Examples are done in class and the book is used only as an additional resource
  - Two midterms and a final
  - 4-5 purely academic "labs"

- **Overall difficulty of the course?**
  - Extremely straight forward, whatever time you put into this class will be directly proportional to what kind of grade you get in this class.
  - Material isn't difficult to grasp, but students who plan on going to graduate school should not take this class

PENNSTATE 1855

HKN

STAT 401
Statistics

- **What is this course about?**
  - Random variables; probability density functions; estimation; statistical tests, t-tests; correlation; simple linear regression; one-way analysis of variance; randomize.

- **Skills/Prerequisites needed for course?**
  - Prerequisite of MATH 111 or MATH 141

- **What will you learn?**
  - Combinational and permutational probability
  - Basics of statistical methods using mean and variance
  - Calculating probabilities using random variables.
  - How to use Multitab (Statistical software)

- **What is the workload?**
  - Homework once every 1-2 weeks. Book problems.
  - Labs: 4-7 labs with questions included (No formal report)
  - Test: 2 in-class tests and one final

- **Overall difficulty of the course?**
  - Homework difficulty ranges from HW to HW.
  - Labs are easier than the homework.
  - Tests are based on the homework.

PENNSTATE 1855

HKN

STAT 414 (MATH 414)

Introduction to Probability Theory

- **What is this course about?**
  - Probability spaces
  - Discrete and continuous random variables
  - Expectations and generating functions
- **Skills/Prerequisites needed for course?**
  - Strong basis in mathematics
  - Willingness to do mathematical proofs
  - Prerequisite of MATH 230 or MATH 231
- **What will you learn?**
  - Analyze real-world problems in probability using probability spaces and random variables
  - Become familiar with commonplace distributions such as Gaussian, Chi-squared, Normal, etc.
- **What is the workload?**
  - Weekly homework problems, involving mathematical derivations and proofs
  - Two midterms and a final
  - No labs
- **Overall difficulty of the course?**
  - Difficult (but rewarding) for students with limited experience in writing proofs

PENNSTATE 1855

HKN

STAT 418
Probability

- **What is this course about?**
  - Determining complex probabilities of dice, marbles, cards, and data
  - Gives a very theoretical based teaching approach to calculating probabilities
  - Gives a strong foundation for later EE classes in Stochastic modeling and Information Theory
- **Skills/Prerequisites needed for course?**
  - Strong understanding of discrete/continuous functions
  - Good understanding of word problems, and application to equations
  - Prerequisite of MATH 230/231
- **What will you learn?**
  - Combinatorial Analyses: Principles of counting, permutations, and combinations
  - Axioms of Probability: Sample spaces, events, conditional probability, and independence
  - Discrete/Continuous Random Variables: Expectations, variance, and various other distributions
  - Limit Theorems: Central limit theorem, Chebyshev inequalities, and law of large numbers
- **What is the workload?**
  - Weekly homework assignments (20%)
  - Two midterms (20%) and a final (40%)
  - Fairly manageable but workload does vary by instructor
- **Overall difficulty of the course?**
  - Varies from instructor-to-instructor
  - Materials/theorems are straightforward, but application of theorems makes this class challenging
  - Concepts are fairly intuitive and require a basic understanding of probability theory

PENNSTATE 1855

HKN

PHYS 410

Introduction to Quantum Mechanics

- **What is this course about?**
  - Introductory course to quantum mechanics
  - Great course for EE students interested in materials and devices (microelectronics, optoelectronics, etc.)
  - Schrodinger's wave equation, stationary states, one-dimensional scattering, hydrogen atom
- **Skills/Prerequisites needed for course?**
  - Math 250 or 251, MATH 230 or 231, and PHYS 237 (a "prerequisite" but only marginally helpful)
  - Proficiency with integration and complex numbers (go EE!); 2x2 matrices and determinants helpful.
  - Understanding concepts crucial for performing calculations correctly; this is not a "plug and chug" course
- **What will you learn?**
  - Expectation values (related to probability) of position, momentum, energy, etc.
  - Reflection and transmission across potential barriers and wells
  - Hermitian operators, the Hamiltonian, and figures of merit from classical mechanics
- **What is the workload?**
  - Weekly problem sets covering assigned readings (typically 4-8 hours)
  - The book (Griffiths) is excellent! Highly recommended reading, straightforward and easy to understand
  - Typically 2 midterms, a final, and no labs
- **Overall difficulty of the course?**
  - Can be overwhelming at times, but if you keep up with lectures it is definitely manageable
  - Homework is the best preparation for tests, usually anything you don't understand is explained in the book

PENNSTATE 1855

HKN

EE 497B

SPRING ONLY

Probability and Random Processes

- **What is this course about?**
  - Created by Jeff Schiano to give EE's a stat elective relevant to the major
  - Stochastic and Random Processes (usually the harder stat concepts)
  - Gives a strong foundation for later EE classes in Stochastic modeling and Information Theory
- **Skills/Prerequisites needed for course?**
  - Strong understanding of discrete/continuous functions
  - Good understanding of word problems, and statistical applications to EE
  - EE 350, and MATH 230
- **What will you learn?**
  - Briefly go over basic principles in Probability
  - Applications of statistics to various fields within EE
  - Information Theory – a quantitative way to represent communication
  - Statistical methods strongly used in later graduate courses in signal processing and communications
- **What is the workload?**
  - Weekly homework assignments, with weekly recitations
  - Do extra problems to get a full understanding of Stochastic and Random Processes
  - Two midterms and a final
- **Overall difficulty of the course?**
  - If you love how Schiano teaches, and are willing to put in the work, definitely worth it
  - Otherwise, you will struggle by constantly keeping up with the multiple facets in probability, random processes, and information theory

PENNSTATE 1855

HKN

Senior Design

PENNSTATE

1855

HKN

EE 403W

Industrial Design Capstone Project

- **What is this course about?**
  - Project designs of electrical engineering systems, encompassing various sub-disciplines within Electrical Engineering, with an emphasis on technical communications skills.

- **Skills/Prerequisites needed for course?**
  - Sufficient knowledge and abilities in a wide variety of EE course material along with technical writing skills
  - Prerequisite: EE 350, EE 310, EE 330, EE 316

- **What will you learn?**
  - The effective methods of project management
  - Material dependent on individual project specifications
  - Technical Writing methods for projects in the world of business

- **What is the workload?**
  - Weekly status reports to both Wheeler and Company Contact
  - Maintaining constant time management to ensure the project will be completed on time
  - Project Design Proposal Paper
  - Mid semester Project Design Review

- **Overall difficulty of the course?**
  - Tim Wheeler- Class requirements are decently laid out and every assignment is allowed to be redone for more credit as long as you learn. Overall difficultly is moderate depending on your chosen company and project.

PENNSTATE 1855

HKN

EE 403W

Senior Design-Regular Section

- **What is this course about?**
  - Senior Design Lab
  - Design process
  - This course allows you to chose your own project

- **Skills/Prerequisites needed for course?**
  - Strong understanding general electrical engineering concepts
  - Ability to give presentations and write technical papers
  - Prerequisite of EE 316, 330, 350 and ENGL 202c

- **What will you learn?**
  - How to work through the design process, from brainstorming to project presenting
  - How to manage a team
  - Basically a culminations of public speaking, technical writing, and electrical engineering

- **What is the workload?**
  - Nothing consistent
  - Lot's of presentations, memos, project proposals, research etc

- **Overall difficulty of the course?**
  - 3/5. Varies depending on choice of project, but will be time consuming
  - Most of the material taught in lecture is in place to help you, and there are no real exams to speak of. Grading is based off technical papers and presentations.

PENNSTATE 1855

HKN

EE 403W

SPRING ONLY

Senior Design–Power Supply Engineering

- **What is this course about?**
  - Senior Design Lab, primarily focused on power supply designs
  - Using digital/analog circuit design to address certain needs from sponsors
  - Course allows you to choose between 2-3 audio engineering companies for project sponsorship
- **Skills/Prerequisites needed for course?**
  - Strong understanding of electrical engineering concepts in signal processing and circuit design
  - Ability to give presentations, write technical papers, and construct project deadlines
  - Prerequisite of EE 316, 330, 350 and ENGL 202c
- **What will you learn?**
  - How to work through the design process, from brainstorming to presenting
  - Learn to manage a team; understand strengths and weaknesses within a group
  - Basically a culminations of public speaking, technical writing, and electrical engineering
- **What is the workload?**
  - Intermediate workload, mixed with weekly large lectures from professional engineers
  - First third of class is teaching students about specific topics in audio engineering (i.e. sampling, quant.)
  - A lot of outside research is needed to understand specific standards in audio engineering
- **Overall difficulty of the course?**
  - 3/5. Varies depending on choice of project, but will be time consuming
  - Most of the material taught in lecture is helpful. No exams
  - Grading is based off approach, concepts, and progress

Faculty:

PENNSTATE

1855

HKN

EE 403W

SPRING ONLY

Senior Design – Microcontrollers

- **What is this course about?**
  - Incorporated around Freescale Smart Car Challenge
  - Large amount of work with microcontroller to create an autonomous vehicle
  - Exposes the student to a variety of topics dealing with control systems and programming
- **Skills/Prerequisites needed for course?**
  - Intermediate understanding of C code
  - Interest in microcontrollers / EE 316
  - Prerequisite of EE 316, EE 330, EE 350
- **What will you learn?**
  - Systems Design
  - Serial Communication
  - C Code
- **What is the workload?**
  - About 10 hours work/week
  - Weekly Quizzes
  - Design Plan, Preliminary Design Review(15 min presentation), and Final Design Review(15 min pres.)
- **Overall difficulty of the course?**
  - Can be stressful at times but not overwhelming
  - Largely dependent on your groups work ethic/ interest in the subject

PENNSTATE 1855

HKN

EE 403W

Senior Design – Individual Project

- **What is this course about?**
  - Work alone with a research professor to help with a particular project
  - These projects can range from the teacher's research, to specific topics chosen by student
  - Make regular reports, focus on designing, then implementation
- **Skills/Prerequisites needed for course?**
  - English 202C Concurrently
  - EE 316, 330, 350, and any two EE technical electives
  - Self-starter mentality, who can work independently
- **What will you learn?**
  - The design process performed everyday in industry/research
  - How to apply skills learned from the EE core classes
  - The importance of good grammar and communication skills when writing technical documents
- **What is the workload?**
  - Weekly status reports
  - Original design plans
  - Presentations
- **Overall difficulty of the course?**
  - Time consuming
  - Difficulty depends on the project, approach, and professor involvement

PENNSTATE 1855

HKN

Questions or Comments

PENNSTATE 1855

HKN

Thanks for coming!

Good luck scheduling!

PENNSTATE

1855

HKN